Mission Restoration Project

EconomicsReport

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for:
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Economics

This report examines a proposal for altering forest vegetation and fuels at the landscape scale in order to authorize landscape restoration activities. Such a change would improve the chances of protecting valuable resources during fire events, improving unsustainable vegetation composition, and providing unrealized opportunities for social and economic benefits. This report discusses the financial aspects of this proposed investment.

Regulatory Framework

Land and Resource Management Plan

The Okanogan National Forest Land and Resource Management Plan does not address economic analysis.

Management Area

Management Areas do not apply to economic analysis.

Manual Policy and Direction

Forest Service Manual 2403.2,Forest Service Manual 1950.2, and the Okanogan National Forest Plan Implementation Guide direct the Forest Service to conduct and document an economic analysis while meeting our purpose and need objectives in NEPA.

Special Area Designations

Special Area Designations do not apply to economic analysis.

Federal Law

National Forest Management Act of 1976 applies to economic analysis.

Executive Orders

Executive Orders do not apply to economic analysis.

State and Local Law

State and Local laws do not apply to economic analysis.

Watershed Analysis

Watershed Analysis does not apply to economic analysis.

Affected Environment

Considered But Not Analyzed in Detail

Figure 1: Resources Considered But Not Analyzed in Detail

Resource	Examples	Rationale for Dismissing from Further Analysis
Benefits	Potential reduction of future fire suppression costs Protection of non-market resource values, existing market value resources, and prior investments Job creation Cost/benefit ratio and present net value	While the costs of implementing many aspects of the proposed project can be expressed in monetary terms, the benefits are not as easily quantified and involve both market and non-market values.
Non-Timber Sale Costs	Plantation Thin, Wetland Thin, and Post & Pole Thin LFR thinning Road closing/decommissioning (Not along approved haul routes for the Timber Sale) Rock Armoring Beaver habitat enhancement/aquatic habitat improvements Culvert replacement	Funding for the different non timber projects can come from a variety of different sources such as appropriations, stewardship receipts, or through partnerships with public and private collaborates. It is this funding uncertainty that will make it difficult to analyze into depth.

Benefits include:

Potential Reduction of Future Fire Suppression Costs

Fire suppression costs are commonly within the rage of $500 per acre, plus value from timber and other harvestable products (Snider et al. 2006). Based on the predicted effectiveness of treatments (see Fire/Fuels report), it is likely that addressing the buildup of fuels at this time could potentially reduce fire suppression costs in the future. This savings would most likely exceed the costs of implementing the strategies described in the proposed action.

Increased efforts to restore forests and treat fuels could have a positive effect on operating expenditures for fire suppression. A 2012 economic assessment for Oregon's Federal Forest Advisory Commission found that for every dollar spent on restoration, there is the potential to avoid $1.45 in the fire suppression costs (Mason, Bruce & Girard, Inc. et al. 2012).

Protection of Non-market Resource Values

Large-scale stand replacement fires, especially in areas where they are not characteristic of the inherent fire regime, can cause substantial damage to forest resources. Resources such as soils, wildlife habitat,

and water, along with scenic values can be substantially affected at a very large scale and for an extended period of time. This type of loss can be difficult to measure in monetary terms but is none-the-less important in terms of ecosystem health. Returning the area to a condition where fire can play a more natural role in the ecosystem would help ensure that the above resource values are protected and managed in a sustainable manner. For a more thorough discussion of non-market benefits see the Soils, Water Resources, and Wildlife Reports.

Protection of Existing Market Value Resources

Other resources that are at risk from widespread uncharacteristic fire behavior, such as range, timber, roads, recreation, and private lands are commonly assigned a monetary value. However, because of the uncertainty regarding risk, and the timing and scale of future fires, it is difficult to assign a dollar figure to the actual losses that would be avoided or reduced because of treatments. The fuels analysis in this document suggests that risk of a large-scale widespread uncharacteristic fire behavioris greater if no action is taken. Such a fire could result in substantial monetary losses, both from damage to forest resources and to private property.

The Okanogan County Assessor's records indicate that within about one mile of the project area there are improvements valued at approximately $4.6 million. Based on a review of 52 parcels of private property, 35 parcels had improvements on them; 25 parcels had improvements valued at more than $50,000 by the Okanogan County Assessor. Any, or all, of these parcels could be developed or further developed, at any time. Losses from a widespread uncharacteristic fire behaviorcould exceed the total costs of treatments proposed in either of the action alternatives.

Access to burned areas is also a concern in conjunction with wildfire. According to the Burned Area Emergency Response (BAER) Report, the Carlton Complex damaged approximately $760,050 in roads and road improvements including drainage improvements, crossings, and other point protections covering state and private lands (Chatel et al., 2014).

Protection of Prior Investments

Portions of the analysis area have had both commercial and non-commercial treatments in the past to reduce stand density, susceptibility to insects and diseases, and fuels buildup. Treatments proposed in the proposed action would move these stands even further towards the desired condition and in some cases would be implemented at much reduced costs and with improved revenue due to these earlier treatments. Without continued treatments, these previous investments, and the gains that have been achieved, are at an increased risk of loss through widespread uncharacteristic fire behavior, insects and disease.

Job Creation

The impact of timber harvest on direct job creation/maintenance depends on the size of the logs, local infrastructure and fluctuations in log markets. Estimated number of jobs directly created/maintained per MBF by harvesting is about 13.2 full time equivalents (FTE) with an additional 55 indirect jobs (Lippke and Mason -2005). Indirect jobs include logging operators, log truck drivers, road engineers, administrators, and other jobs associated with the sale, not necessarily employed with a saw mill. With those assumptions, approximately 82.7 (6.27 MBF at 13.2 jobs per MBF) full time equivalent jobs would be created by timber harvest.

On average, the Methow Valley Ranger District through their ladder fuel treatment projects create 4.4 FTE jobs per 1,000 acres and 2.1 jobs per 1,000 acres for prescribed burning (Trebon 2016 –Personal Communication). The jobs created by fuels projects depend on their location and skillset of the workforce.

Cost/Benefit Ratio and Present Net Value

Because the action alternatives involve non-market benefits and there is uncertainty regarding future fire behavior meaningful numerical Cost/Benefit ratio or Present Net Value analysis is not possible. However, a qualitative comparison is still possible by comparing the benefits described above (and reviewing the resource effects reports) with the treatment costs. In an area with such high market and non-market values, it appears that the cost of implementing the proposed action constitutes a good investment.

Non-Timber Sale Project Costs:

The proposed action requires a level of investment that may not be possible within current or expected levels of appropriations. In order to be as effective as possible within budget constraints, an implementation plan would be developed that prioritizes treatments. General guidelines have been developed that would be used to guide this prioritization process. The following three types of treatments have been identified as having the highest priority for implementation.

- Areas closest to the wildland-urban interface (WUI) and emergency egress routes.
- Strategically located treatment units, which because of their location would have a relatively greater effect on modifying fire behavior at the landscape scale.
- Treatments that could be implemented with little or no cost, or which generate funds which can be used to pay for other treatments.

The issue of strategic placement and timing of treatments to effect fire behavior at the landscape scale is the most critical of these in terms of budget constraints. As part of the implementation process, further analysis would be performed to identify the most effective sequence of implementation given budget expectations.

Costs for all projects are approximate and will need to be assessed during the implementation stage of this Environmental Analysis.

Figure 2: Potential Non-Timber Sale Project Costs (in millions).

List of Non-Timber Sale Project Costs	Alternative 2	Alternative 3
Plantation Thin, Wetland Thin, and Post & Pole Thin	0.96	0.96
LFR Thin including machine piling	0.02	0.02
Road Closing/ Decommissioning Projects	0.35	0.58
Beaver Habitat Enhancement	0.01	0.01
Rock Armoring	NA	0.12
Culvert upsizing for non-fish passage	0.12	0.12
Culvert upsizing for fish passage	0.64	0.64
Coarse Woody Debris Enhancement	0.01	0.01
Total	**2.11**	**2.46**

Resource Indicators and Measures

Figure 3: Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: P/N, or key issue?	Source (LRMP S/G; law or policy, BMP's, etc.)?
Viability	Costs directly related to the Timber Sale	Dollars	No	None

Methodology

This analysis is performed by the use of different spreadsheets. These spreadsheets are: LogCost (provides stump to truck costs), HaulCost (provides Hauling costs), PQA (provides a value for saw log and non saw log products), and TEA-R6 Econ (provides an overall viability of the project).

Data and other information was provided by field personnel, engineers, and the silviculturist to complete the above spreadsheets.

Costs for all projects are approximate and will need to be assessed during the implementation stage of this Environmental Analysis. Timber sale brush disposal treatment plan costs on the Methow Valley Ranger District typically average $110 per acre as part of the timber sale. Essential reforestation collection (SAI-KV) agreement costs typically average $800 per acre of regeneration harvest treatment. These costs are highly variable depending on acres burned, acres planted, acres of slashing for site preparation, site preparation for planting and natural regeneration, fireline construction costs, slash piling, planting and fuels inventories, burning, etc.

Cost Efficiencies

In the case with fuels treatments, whole landscapes are more efficiently treated than smaller blocks because natural fuel breaks or existing roads may be used for control lines and project planning per acre is reduced. When harvest units are not contiguous with natural fuel treatment units, then costs associated with containment are much higher. A typical unit that has a road directly on the burn boundary may require only a fire line to be constructed and manned across one side of the unit if the adjacent stands are planned to have natural fuels treatments, and the whole area can be burned at the same time. Without contiguous landscape treatments containment costs can be two or three times higher, to the point that the timber sale may not have sufficient receipts to pay for the fuels treatment. Layout and implementation costs are also higher as the distance from an open road is increased. Note that portions of stands that are not likely to receive timber harvest treatments may still receive the ladder fuel reduction and underburn treatments, but the cost to implement those treatments may be higher due to steepness and longer distances from open roads.

Impact Level Definitions

Impact Types for Timber Sale Costs are:

- Beneficial: We propose a Timber Sale in which the monetary benefit is greater than the direct costs.
- Adverse: We propose a Timber Sale in which the monetary benefit is less than the direct costs.

Impact Duration for Timber Sale Costs are:

- Short term: Occurring during the Timber Sale and associated project activities.
- Long term: 5 to 7 years post-project.

Impact Intensities for Timber Sale Costs are:

- None: No impacts to Timber Sale Costs
- Negligible: Impacts to Timber Sale Costs are less than $10,000 in monetary revenue that can be used to support Non-Timber Sale Projects.
- Minor: Impacts to Timber Sale Costs are between $10,000 and $100,000 in monetary revenue that can be used to support Non-Timber Sale Projects.
- Moderate: Impacts to Timber Sale Costs are between $100,000 and $350,000 in monetary revenue that can be used to support Non-Timber Sale Projects.
- Major: Impacts to Timber Sale Costs are more than $350,000 in momentary revenue that can be used to support Non-Timber Sale Projects.

Affected Environment

Figure 4: Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure (Quantify if possible)	Existing Condition (Alternative 1)
Viability	Costs directly related to the Timber Sale	Dollars	None (increased risk of loss)

The project area has 1,952 acres that have been identified for commercial timber harvest. The primary stand structure within the Project Area is Young Forest Multi- Story.There is approximately6,300 Thousand Board Feet (MBF), or 12,600 Hundred Cubic Feet (CCF) of harvestable timber. Without

harvest and thinning treatments, these acres at an increased risk for disturbances(wildfires, insects, and disease).

Environmental Consequences

Alternative 1 – No Action

Alternative 1 does not include any harvesting or selling Forest Products. The impact of Alternative 1 would be adverse, long-term, and minor because without continued treatments, previous investments and the gains that have been achieved are at an increased risk of loss through widespread uncharacteristic fire behavior, insects, and disease. Large-scale stand replacement fires, especially in areas where they are not characteristic of the inherent fire regime can cause substantial damage to both private and public resources. As discussed in the fire/fuels analysis, under the No Action Alternative, the area would continue to be at and increasing risk of widespread uncharacteristic fire behavior.

"The cost of firefighting could and should be considered a cost of not removing high fuel loads. . . If the negative impacts that result from crown fires were fully reflected in the market, there would be a high motivation to avoid them, providing necessary incentive to remove excess fuel loads in spite of the cost" (Mason et. al, 2006).

Alternative 2 and 3

There are no differences in the proposed commercial harvest between Alternatives 2 and 3 so the economic effects of the timber sale will be the same and they will be analyzed together. Alternative 3 includes additional road closing/ decommissioning and rock armoring/hardened fords work. Cost estimation from the additional work can be found in Figure 2 but were not included in this analysis.

Monetary Return from the Sale of Forest Products

Alternatives2 and 3 includes about 1,952 acres of proposed harvest treatments where commercially valuable timber would be removed as a byproduct of that treatment. The value of these marketable products can substantially reduce the overall costs of the project. The impact of Alternatives 2 and 3 would be beneficial, long-term, and moderate because with treatments, monetary benefits can be used to fund restoration activities on the landscape.

Ground based equipment could be used to log 1,833 acres and the other 119 acres could be harvested by the use of a standing skyline system. Thisstanding skyline system would be designed to achieve at least one end suspension of the harvested timber. Mobilization and logging costs for the ground based are estimated to be $136/MBF and $223/MBF for the skyline portion of the timber sale.

It is expected that approximately 6,300 MBF (thousandboard feet), or 12,600 CCF (hundred cubic feet) would be harvested by ground based and skyline based felling and yarding equipment. June 2016 log prices for delivered Douglas-fir are $380.85/MBF, harvesting 7 to 23.9 inch DBH trees would generate $2.73 million in timber value at the mill. After logging operations including :felling, skidding, processing, loading, required brush disposal, road maintenance,and required mitigation including: rock armoring, erosion control and reforestation (SAI- KV Collection Agreement costs on the planned 80 acres of Variable Retention Regeneration harvest would be an estimated $64,000), there would remain approximately $0.31 million that could be used to supplementor support other planned projects.

Some commercial sized trees, up to 14 inches dbh, would be fell in areas inaccessible to logging equipment in order to meet landscape fuel objectives. These trees would not be available for harvest or firewood.

Because these steep and/or unroaded area are marginally suitable for timber management, it is not likely that the removal of these trees from the stands would reduce the future timber value for the project area.

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Effects

Figure 5: Resource Indicators and Measures for the Proposed Action.

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Proposed Action
Viability	Costs directly related to the Timber Sale	Dollars (in millions)	0.31

Cumulative Effects

There are no cumulative effects related to the financial aspects of the project since costs and benefits are shown over a multi-year basis.

Conclusion

It appears that this Timber Sale would be viable and have a moderate impact that could potentially contribute $310,000 to Non-Timber Sale Projects.

Glossary

CCF – Hundred Cubic Feet, a measurement of timber volume

Full Time Equivalent Jobs-the number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs.

MBF – Thousand Board Feet, a measurement of timber volume

SAI-KV – Reforestation and Sale Area Improvement trust fund authorized by the Knutson-Vandenberg act of 1930.

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September 14, 2014

Implications of Working Forest Impacts on Jobs and Local Economies

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National Forest Health Restoration

An Economic Assessment of Forest Restoration on Oregon's Eastside National Forests

Prepared for:
Governor John Kitzhaber and Oregon's Legislative Leaders

November 26, 2012

Investments in Fuel Removals to Avoid Forest Fires Result in Substantial Benefits

C. Larry Mason, Bruce R. Lippke, Kevin W. Zobrist, Thomas D. Bloxton Jr., Kevin R. Ceder, Jeffrey M. Comnick, James B. McCarter, and Heather K. Rogers

ABSTRACT

Forest fuel reduction treatments are needed, as shown by the increased number and cost of devastating crown fires in overly dense forests. Although large trees can be removed for valuable products, the market value for the smaller logs may be less than the harvest and hauling charges, resulting in a net cost for thinning operations. However, failure to remove these small logs results in the retention of ladder fuels that support crown fires with destructive impacts to the forest landscape. A cost/benefit analysis broadened to include market and nonmarket considerations indicates that the negative impacts of crown fires are underestimated and that the benefits of government investments in fuel reductions are substantial.

Keywords: forest fuels, nonmarket values, small-diameter logs, cost/benefit analysis, forest fires

If the negative impacts that result from crown fires were fully reflected in the market, there would be high motivation to avoid them, providing necessary incentive to remove excessive fuel loads in spite of the cost (Pfilf et al. 2002). For example, the cost of fighting fire could and should be considered a cost of not removing high fuel loads (see Figure 1). Similarly, there is the value of avoiding facility losses and fatalities. Communities value lower fire risk and reduced smoke. Forest fires destroy visual esthetics and limit recreational opportunities. Irreplaceable habitats for threatened and endangered species may be lost when forests burn. Valuable timber resources are destroyed. Forest fires consume forest biomass that otherwise could be used for products and clean energy conversion, and smoke increases atmospheric carbon associated with global warming.

Regeneration after fires is problematic and costly. Postfire invasion of exotic species may further threaten ecosystem recovery. Investments in postfire rehabilitation may be needed to avoid serious erosion, sedimentation, and water contamination. Conversely, if excess forest stems are removed to reduce hazardous fuel loads, then water otherwise consumed by overly dense forests could be available for other uses such as habitat, municipal reservoirs, and irrigation while also improving the health of remaining trees. Fuel reduction activities result in rural economic development benefits from the taxes and rural incomes generated by job creation. Because economic activity in these regions has been in decline as a consequence of lower federal timber harvests, any reduction in unemployment has higher than normal leverage on state and local finances by lowering assistance costs.

Forests thinned to remove fuel loads are unlikely to experience crown fires (Omi and Martinson 2002). Accounting for the full value of this reduced risk exposure, however, must take into consideration both the predicted costs of the activity as well as the approximated timing and cumulative values of avoided future fire events. Although it is impossible to predict exactly when a future fire might occur in a specific location, we do know that because of decades of fire suppression, the time since last burn in many forests is well beyond prior fire return cycles and that present fuel loads are well outside of historic levels (Agee 1993). Fire ecologists agree that the question is not whether these forests will burn but when.

Public Benefits of Fuel Reduction Investments

The challenge of developing long-term strategies to reduce wildfire risks across tens of millions of acres of Inland West forest is daunting. The body of information to be considered is huge and the planning process may be formidable. Infrastructure is limited, funding is scarce, costs are high, and politically charged conflicts are rampant. Strategies to help professionals, interested lay publics, and policymakers gain better understanding of the present circumstances and the future possibilities of hazardous fuel reductions are needed.

It is reasonable to assume that at some time there will be a forest fire in almost all high and moderate-risk forests and that such an inevitable event can be characterized as a

The Irrationality of Continued Fire Suppression: An Avoided Cost Analysis of Fire Hazard Reduction Treatments Versus No Treatment

Gary Snider, P.J. Daugherty, and D. Wood

ABSTRACT

Without large-scale implementation of fire hazard reduction treatments, the costs of uncharacteristic crown fires in southwest forests will continue to increase. Federal policy continues to allocate vastly more funds to suppression than to prefire hazard reduction. We examined the economic rationality of continuing this policy of emphasizing fire suppression activities over restoration-based fire hazard reduction treatments. We compared treatment plus fire suppression costs to the cost of fire suppression without treatments over 40 years for southwestern forests. This avoided-cost analysis estimates the amount one could invest in treatments to avoid the future cost of fire suppression. Using conservative economic values, we found that avoided future costs justifies spending $238–601/ac for hazard reduction treatments in the southwest. We conclude that the policy of underfunding hazard reduction treatments does not represent rational economic behavior, because funding hazard reduction would pay for itself by lowering future fire suppression costs.

Keywords: economics, restoration, avoided cost, fire, fire hazard reduction

The history and culture of forest fires in the United States has been chronicled and described by Pyne (1982), Pyne et al. (1996), and Arno and Allison-Bunnell (2002). In 1905, the Bureau of Forestry became the USDA Forest Service with the responsibility of protecting newly designated forest reserves. A critical part of its charge was the prevention and control of fires. In 1908, Congress set up a system, "like an open checkbook," that essentially authorizes deficit, unlimited expenditures for fire suppression (Pyne et al. 1996, Arno and Allison-Bunnell 2002). Subsequent to the fires of 1910 the Forest Service embarked on a campaign to "battle fire to death" (Pyne 2004). Since that time the fire suppression checkbook has never run out of blank checks and remains open to this day.

Although it has become increasingly apparent that an ounce of presuppression activity is worth a pound of suppression funds (Pyne et al. 1996, Daugherty and Snider 2003) federal land-management agencies continue to allocate vastly more funds to suppression activities than to prefire hazard reduction. To a large degree, the history and institutional culture of management agencies and a long-conditioned public have perpetuated this policy of investing in the further disruption of fire cycles and the continued depreciation of forest values. In this article we examine the economic rationality of continuing this policy.

Historical practices starting with European settlers (e.g., overgrazing in the late 1800s, selective harvesting of large trees, and fire exclusion) have created vast areas of unhealthy forest ecosystems in the southwestern United States (Covington and Moore 1994). These practices have caused significant structural and functional changes in southwestern ponderosa pine (PP) and dry mixed-conifer (DMC) forests that include unprecedented tree densities and fuel loadings and anomalous fire regimes that are inconsistent with the region's evolutionary history (Covington and Moore 1994, Dahms and Geils 1997). The overly dense conditions, exacerbated by drought, have increased bark beetle mortality and the size and frequency of stand-replacing crown fires. These interconnected symptoms warn society of the jeopardy of losing these forest ecosystems. To avoid this loss, we must implement large-scale restoration-based thinning treatments designed to significantly reduce tree densities, improve the cover, composition and production of the herbaceous understory, and reintroduce fire to its normal disturbance regime (Fule et al. 2002), sooner rather than later.

Rieman et al. (2003) argued that we need additional study as to the effects of restoration-based thinning treatments and the use of fire in management on organisms, habitats, watersheds, and ecosystem processes. Continued study and research is necessary if we are to truly implement adaptive